Differences in Chronic Health Conditions, Food Security Status, and Dietary Intake By Perceived Health Status In an Urban At-Risk Population

Undergraduate Thesis

Presented to Graduate with Distinction from

School of Health and Rehabilitation Sciences of The Ohio State University

By

Hannah Hart

Medical Dietetics Program in the School of Health and Rehabilitation Sciences

The Ohio State University

2016

Thesis Examination Committee:

Dr. Colleen Spees, Advisor

Dr. Christopher Taylor

Background and Problem Statement

Food security exists when individuals have sufficient access to safe and nutritious foods to maintain health (1). In 2014, more than 48 million Americans (including 15.3 million children) were food insecure (1). Food insecure households often rely on food pantries for emergency food assistance, yet this supplemental food assistance often fails to meet their optimal dietary needs. In 2013, 16.9% (1.9 million people) of Ohioans experienced food insecurity (2). Currently, Ohio ranks 3rd nationally for rates of very low food security (1).

The *Hunger in Ohio 2014* study reported that 81% of food pantry patrons purchased inexpensive, unhealthy food to cope with financial hardship (3) that may impact health outcomes. In addition, almost 30% of food insecure individuals reported conflicting fiscal demands between paying for food and paying for medicine or medical care within the past year and 40% reported having no primary care physician. The chronic lack of access to healthy foods and poor access to healthcare leads to health disparities that make food insecure families more vulnerable to chronic disease (4). Preliminary data from a pantry survey revealed higher levels of obesity, hypertension, and type 2 diabetes mellitus, all of which are risk factors for cardiovascular disease, in Central Ohio food pantry patrons as compared to county, state, and national levels (*Spees, in press*, Table 1). Health perception can be defined as a subjective rating chosen by the affected individual of his or her own health status (5).

Conditions	Food Pantry[a] (%)	Franklin County[b] (%)	Ohio[c] (%)	U.S.[c] (%)
Diabetes	15.1	9.8	10.1	8.7
Heart Disease	8.4	No data	3.9	4.9
Hypertension	41.4	28.5	31.7	28.7
High Cholesterol	26.3	38.6	39.6	37.5
Obese	38.2	31.4	30.1	35.7
Disability	40.9	11.0	13.4	12.0

Table 1. Disparities in the Prevalence of Health Conditions by Food Pantry Clients versus Regional, State, and National Percentages, 2012-2013

[a] Pantry clients age ≥ 18 years, 2012.

[b] County HealthMap (6).

[c] Centers for Disease Control – Behavioral Risk Factor Surveillance System (7,8).

According to the Center for Disease Control and Prevention (CDC), the number of Americans who have a positive health perception has declined over in the past few decades. In 1995, 24.7% of the US population rated their health as "Excellent" (9). In 2013 only 18.6% believed their health was "Excellent"(10). The number of American who have a negative health perception has also increased (9,10).

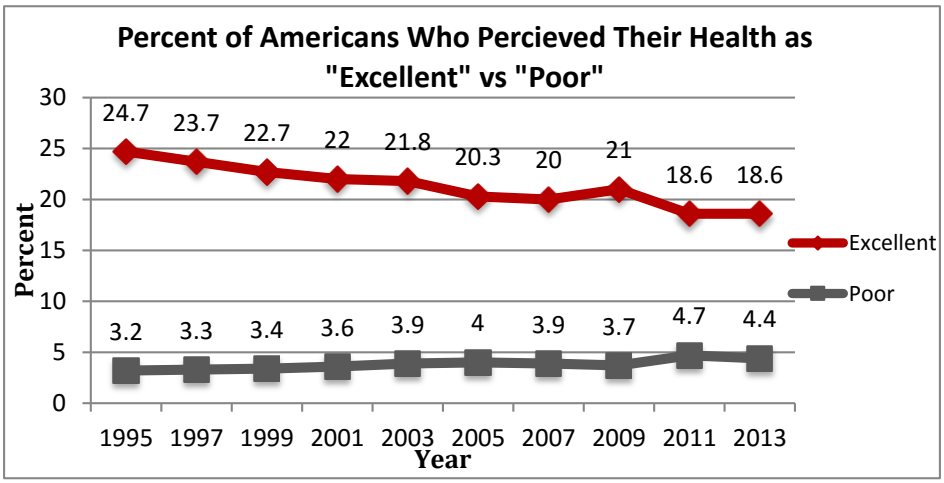

Figure 1. Behavioral Risk Factor Surveillance System (BRFSS) Self-Reported Health Status 1995 – 2013 (9,10).

This change in positive and negative health perceptions could be influenced by a variety of factors, including increased fiscal demands, greater levels of food insecurity, less access to healthcare, lower rates of preventive screening (*Spees, in press*), and more high risk behaviors (11, 12). For example, it is possible that a participant perceives their health positively yet has poor nutritional intake or has been diagnosed with chronic disease. This indicates room for future educational interventions. Conversely, it is also possible self-rated health status correlates with the incidence of disease, poor diet, and other modifiable health-risk behaviors.

This study aimed to define and characterize chronic disease, food insecurity and dietary intake data by perceived health status. These data will inform future targeted interventions that address the public health and nutrition burdens of Central Ohioans.

Related Research

Food insecurity is common among those who utilize food pantries as a safety net. A cross-sectional survey of the state of Ohio revealed over 85% of Ohio food pantry patrons sampled were food insecure (13). Over 93% of food pantry users in Franklin County were food insecure (13).

To assess the health status of pantry clients, our team launched a multidisciplinary health initiative that provided assessment, education, referrals and follow-up services for food pantry clients on the Southside of Columbus. Titled CARE Connect, preliminary data revealed that 51% (n=38) of participants reported a known diagnosis of hypertension, 32% (n=24) diabetes, and 19% (n=14) respiratory disease. Levels of chronic disease has been associated with food security status in the literature.

Using self-report and clinical diagnosis, the National Health and Nutrition Examination Survey (NHANES) reported an increased risk of hypertension and diabetes among a food insecure population (14). Other cross-sectional studies found similar connections between food insecurity and prevalence of chronic disease (15). Low-income households are more susceptible to food insecurity and as a result, face many barriers to healthy eating. Lack of adequate resources, transportation issues, safety issues and elevated prices for fresh foods are a few examples of possible barriers to healthy dietary intakes (16). A cross-sectional study of female food pantry clients examined diet quality using the Healthy Eating Index (HEI) (17). On a 100-point scale (where 100 = optimal intake), the average HEI score was 43, indicating a poor overall diet quality as compared to the US Dietary Guidelines.

Component	Maximum points	Standard for maximum score	Standard for minimum score of zero
HEI-2010[1]			
Adequacy:			
Total Fruit[2]	5	≥0.8 cup equiv. per 1,000 kcal	No Fruit
Whole Fruit[3]	5	≥0.4 cup equiv. per 1,000 kcal	No Whole Fruit
Total Vegetables[4]	5	≥1.1 cup equiv. per 1,000 kcal	No Vegetables
Greens and Beans[4]	5	≥ 0.2 cup equiv. per 1,000 kcal	No Dark Green Vegetables or Beans and Peas
Whole Grains	10	≥1.5 oz equiv. per 1,000 kcal	No Whole Grains
Dairy[5]	10	≥1.3 cup equiv. per 1,000 kcal	No Dairy
Total Protein Foods[6]	5	≥2.5 oz equiv. per 1,000 kcal	No Protein Foods
Seafood and Plant Proteins[6,7]	5	≥0.8 oz equiv. per 1,000 kcal	No Seafood or Plant Proteins
Fatty Acids[8]	10	(PUFAs + MUFAs)/SFAs ≥2.5	(PUFAs + MUFAs)/SFAs ≤1.2
Moderation:			
Refined Grains	10	≤1.8 oz equiv. per 1,000 kcal	≥4.3 oz equiv. per 1,000 kcal
Sodium	10	≤1.1 gram per 1,000 kcal	≥2.0 grams per 1,000 kcal
Empty Calories[9]	20	≤19% of energy	≥50% of energy

Table 2. Healthy Eating Index 2010 (17)

When stratified into food categories, data revealed pantry users did not consume adequate fruit, whole grains, dark green or orange vegetables. Interestingly, only maximum meat and beans scores were sufficient. Over half of this population reported some level of food insecurity (18). A food pantry study in Connecticut showed similar results (19). People considered food insecure consumed fewer fruits, vegetables, and less fiber than their food secure counterparts. This study suggested that food donors and providers should strive to improve the nutritional quality of food pantry inventory by incorporating fresh fruits and vegetables into emergency food relief venues. When nutritional quality of food boxes, supplied by the Foodbank of Western Massachusetts was analyzed, food boxes were found to have low nutrient density for calcium and Vitamin C using the Index of Nutritional Quality (20). Using Total Diet Assessment Software to determine the number of food group servings, food boxes were also found to contain dairy foods and fruits in the lowest number of servings. Fats, oils and sweets made up the majority of servings in the boxes. Analysis of food boxes in different states shows similar results (21,22). These studies imply that further interventions to improve dietary intake among the food pantry population are warranted. Limited research was found in relation to nutrition quality of foods from client choice pantries.

The Health Belief Model explains that four major factors (perceived susceptibility, severity, benefits, and barriers) influence people's health-related behaviors (23). One study found a significant association between self-reported health status and food insecurity in a rural Mississippi population. Those who reported their

health as “poor” or “fair” were more food insecure and had worse scores on mental and physical health screenings (24). Yet there remains a paucity of research describing the connection between health perceptions and dietary intake.

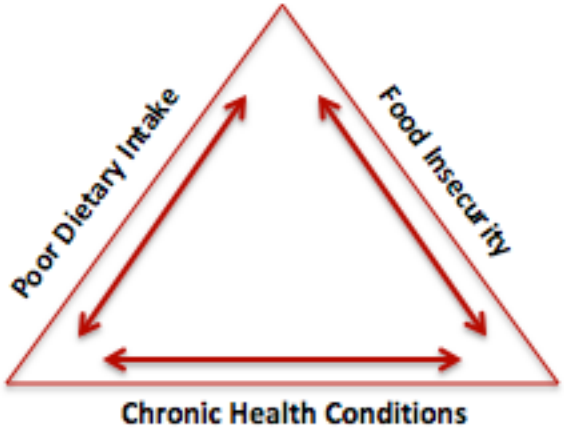

Figure 2. The relationship between diet, food insecurity and chronic disease.

Study Objectives

The prevalence of food insecurity remains high. Inadequate access to nutritious food can contribute to the development of chronic disease. The objective of this study is to determine the characteristics between perceived health status (positive vs negative) in an urban at-risk population. To determine the relationships, this study will explore the following questions:

1. Are there differences in participants’ perceived health status and presence of self-reported chronic health conditions?
2. Are there differences in participants’ perceived health status and presence of disease as defined by objective biomarkers of health?

3. Are there differences in participants' perceived health status and food security status?
4. Are the differences in participants' perceived health status and dietary intake?

Methods

CARE Connect Study

CARE Connect, a 2014 SHRS-funded study, aimed to determine the prevalence of health conditions among food pantry clients, the association between health conditions and food security, and the feasibility of providing health assessments and primary care referrals to those presenting with symptoms or risk of disease. This multidisciplinary initiative provided cardiovascular, mental health, musculoskeletal, respiratory, and caregiver health screenings. Faculty and students from the School of Health and Rehabilitation Sciences across all disciplines were trained and volunteered to conduct screenings in their areas of expertise. Based on the assessment results, participants received either general education and/or primary care referrals (Figure 3). Participants also received a $10 gift card at their completion of the study.

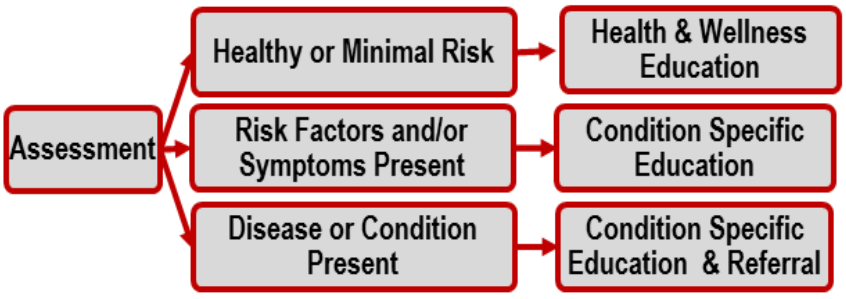

Figure 3. CARE Connect Assessment and Evaluation Process

A. Population and Sample

The parent study, CARE Connect, was an IRB-approved pilot conducted at a Southside Columbus food pantry conducted in summer, 2014. English speaking adults (N=122) were recruited to participate.

B. Data Collection & Preparation

Demographics

Survey questions included race, age, gender, marital status, socioeconomic status, current employment and education level. Health status questions included primary medical home, health insurance, utilization of social services, chronic disease, disabilities, high-risk behaviors, perceptions of health and self-efficacy. Barriers to healthy eating and food access consisted of questions relating to transportation, caregiving, childcare, and financial tradeoffs. All data was entered into iPads using REDCap (Research Electronic Data Capture), a secure e-data management system.

Food Security Status

Food security status was categorized as "marginal or high food security," "low food security," or "very low food security" based on the USDA's 6-question household food security module (25) (Appendix A)**.** If participants answered affirmatively on 0-1 questions they were considered to be fully or marginally food secure (FS/MFS). Affirmative responses on 2-4 questions indicated low food security (LFS), while an affirmative response on 5-6 questions was categorized as very low food security (VLFS).

Health Perceptions

Using the Personal Health Assessment (PHA) participants were asked, "Would you say that in general you general health is…" and then prompted to rate their health from "excellent" to "poor" (Appendix B). The answer selections also provided "prefer not to answer" and "don't know" as possible choices. Those who responded "poor" or "fair" were classified as having a **negative perception** of their health, while those who responded "good", "very good" or "excellent" were classified as having a **positive perception** of their health.

Dietary Intake

Participants were asked in face-to-face interviews about their typical dietary intake using the NHANES Dietary Screener Questionnaire (DSQ) (26). The DSQ estimates intake of various foods using scoring algorithms. The scoring algorithms convert participant responses into amounts of the food consumed per month (Appendix C).

Chronic Disease

Self-Report

The PHA also measured prevalence of chronic disease. Comorbidities were self-reported and options included: Type II Diabetes, Hypertension, Obesity, Cancer, or Other (with open text box for type-in answers).

Clinical

Biomarkers of cardiovascular health were also collected. Blood pressure (BP) was measured using an automatic cuff. Blood pressure <120/80 reflected a normal reading; 121-139/81-89 indicated prehypertension; and >140/90 reflected the presence of

hypertension (27). Height and weight were assessed using a stadiometer with a vertical backboard and moveable headboard. These measurements were used to calculate Body Mass Index (BMI). A BMI <18.5 was considered underweight; 18.5-24.9 was classified as normal; 25.0-29.9 indicated overweight; and >30.0 indicated obesity (29). All biomarkers were recorded to determine risk for cardiovascular disease (heart attack & stroke).

A blood sample was collected using a finger stick to obtain non-fasting blood glucose, glycated hemoglobin (HbA1c). A non-fasting glucose reading <200 mg/dL as considered normal while >200 mg/dL indicated risk of diabetes. HbA_{1c} >6.5% also was classified as high risk for diabetes (28). An Alere Cholestech LDX® System measured non-fasting glucose. A cardiovascular scorecard was developed to record the comprehensive assessment results and categorize participants into low/medium/high risk based on subjective and objective results. These scorecards informed decisions to educate and refer clients (Appendix D).

c. Instrumentation & Data Analysis

Data were analyzed for all participants who completed both the personal health assessment and dietary screener and who responded to the open-ended question, "Would you say that in general you general health is…". Of the total participants enrolled in the study (N=130), eight (6.2%) were excluded from the final sample due to non-response or a response of "Don't know" to the health perception question. Data was tabulated using SPSS with statistical significance set at $\alpha < 0.05$. Descriptive statistics

included race, gender, education level, employment, presence of diagnosed chronic conditions, and perceptions of health.

Presence of chronic health conditions, clinical biomarkers of health, and food security status were all treated as categorical variables, and Chi square analysis were compared to each of the variables compared to the health perception categories. Dietary intake was analyzed using Independent Samples T-tests to compare the mean dietary intake of various food groups compared to the health perception groups.

Results

Demographics

Among the 130 participants enrolled in the study, 65% identified as female, 70% were African-American, 44% were high school graduates, and 39% were unemployed.

Participant Characteristics	
Characteristic	**Valid % (n)**
Sex	
Female	64.5 (78)
Male	35.5 (43)
Race/Ethnicity	
Black/African-American	69.2 (90)
White	30.8 (40)
Education	
<12	23.3 (30)
HS/GED	44.2 (57)
College (at least 1 year)	31.8 (41)
Employment	
Employed	27.6 (32)
Unemployed	38.8 (45)
Retired	13.8 (16)
Disabled	19.8 (23)

Fig. 3. Demographic characteristics of food pantry clients

Health Perception

Of the 122 participants who responded to the question, "Would you say that in general you general health is…," 51% reported a positive health perception and 41% reported a negative health perception.

Self-Reported Chronic Disease

Of the total participants, 29% self-reported known hypertension, 2% reported overweight or obesity, and 19% reported known type II diabetes. Those who responded with a negative health perceptions were significantly more likely to report hypertension (42%) as opposed to those with a positive health perceptions (19%, p=0.007). No other significant difference between self-reported health conditions and health perceptions was found.

Clinical Biomarkers of Health

Objective measures of blood pressure resulted in 90% of participants categorized in the pre-hypertensive or hypertensive range. BMI calculations revealed that 71% of participants were overweight or obese. HbA1c results found that 24% were found to have values consistent with type II diabetes. No significant differences were found between presence of hypertension (p=0.817), overweight/obesity (p=0.670), or type II diabetes (p=0.707) and health perceptions.

Food Security Status

One participant's data was excluded from this sample due to missing data. Thirty six percent of the remaining sample (N=121) were categorized at fully or moderately food secure, 40% as low food secure, and 24% as very low food secure. No significant

difference between food security status and health perceptions was found in this cohort (p=0.433).

Dietary Intake

Significance differences were documented in dietary intake between health perception groups (Table 3). Those with negative health perceptions consumed significantly less cups of dairy (p=0.040), and less cups of fruit/vegetables/legumes (p=0.050). No significant differences between sugar sweetened beverages (p=0.580) or fruits/vegetables/legumes, excluding fried potatoes (p=0.083), and health perceptions were noted.

		Positive Perception n=62		**Negative Perception n=60**		
Characteristic	**Category/Variable**	**Sample Size (n)**	**Percent (%)**	**Sample Size (n)**	**Valid Percent**	**p-value**
Self-Reported Chronic Disease	Type II Diabetes	9	14.5	13	21.7	0.304
	Hypertension	12	19.4	25	41.7	0.007*
	Obesity	0	0	2	3.3	0.147
	Cancer	1	1.6	3	5.0	0.294
	Other	6	9.7	8	13.3	0.526
Clinical Biomarkers	Hemoglobin A1c	14	22.6	15	25.0	0.707
	Blood Pressure	55	88.7	54	90	0.817
	Body Mass Index	42	68.9	42	72.4	0.670
Food Security Status	Full / Marginal	25	41.0	19	31.7	0.433
	Low	24	39.3	24	40.0	
	Very Low	12	19.7	17	28.3	
		Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**p-value**
Dietary Intake	Dairy (cups)	1.92	1.88	1.35	0.86	0.040*
	Sugar sweetened beverages (tsp)	15.30	19.16	13.23	20.53	0.580
	Fruits/Vegetables/Legumes (No Fried Potatoes) (cups)	2.61	1.46	2.19	1.12	0.083
	Fruits/Vegetables/Legumes (cups)	2.80	1.51	2.31	1.14	0.050*

Table 3. Differences in Self-Reported Health Conditions, Clinical Biomarkers, Food Security Status and Dietary Intake by Health Perception
*Denotes significance ($p<0.05$)

Discussion

In the present study, of the health conditions reported, only self-reported hypertension was associated with health perceptions. The absence of significant associations between health perceptions and the other self-reported health conditions in our studies contradict other literature. Previous studies have shown self-rated health perception can predict both morbidity and mortality (30). Clinical biomarkers in this study determined higher percentages of clients with prehypertension or hypertension, diabetes mellitus, and overweight/obesity than was self-reported. It is possible this population did not report additional health conditions due to lengthy gaps in preventative health screening, undiagnosed and unmanaged disease, and possible lower levels of health literacy. Health literacy, as defined by the American Medical Association is, "the ability to obtain, process, and understand basic health information needed to make appropriate health care decisions" (31).

Research documents that those at risk for lower health literacy include racial minorities, those with less than a high school education, and those with compromised health status (32). The majority of our population was high-school educated, African-American women. Approximately half of all participants rated their health status as either "poor" or "fair." Research supports that people with diabetes who have a lower level of health literacy have less knowledge about their disease and its medical management. Not only must health literacy be considered, but also the

disproportionate number of African Americans who are affected by hypertension. Indeed, African Americans are at a higher risk for hypertension than other ethnicities. The Heart and Stroke 2015 update from the American Heart Association reported 45% and 46% of African American males and females respectively, had hypertension (33). It is plausible that a significant relationship was found between self-reported hypertension and health perception because high blood pressure unduly affects this population. Therefore, hypertension must be monitored closely and treated aggressively with this population.

Food security status was not associated with health perceptions at all. The lack of associations between food security status and health perceptions implies that food insecurity may not impact the way in which one perceives their own health. This finding is inconsistent with the literature used to support our research questions (24). According to Maslow's hierarchy of needs, physiological needs are the most basic requirements to be met to support human functioning. Those needs include air, water, food, clothing, and shelter. When physiological needs are met, a person can progress to meet their next level of needs, safety needs. Safety needs include protection from the elements, security, order, and stability. This includes security and stability physically, mentally, and emotionally (34,35). A possible explanation for these results is the attempt to meet basic needs such as food, water and shelter is of greater importance for this population than their own physical health, because that is the level of need that must be met first. Future interventions may need to work to reduce the barriers to basic

physiological needs within this population, so the importance of long-term health and chronic disease management can be addressed more clearly.

Dietary intake was associated with a more positive health perception in the cases of dairy and fruits/vegetables/legumes consumption. Research shows people who follow a diet that includes adequate intake of dairy enhance their intake of certain nutrients such as calcium, potassium, and magnesium (36). Sufficient intake of these nutrients have the ability to impact risk for cardiovascular disease among African Americans (37). It is possible that participants consuming more cups of dairy have better health perceptions because they are following a more balanced diet. This association is similar to that of fruits/vegetables/legumes consumption and health perception. The World Health Organization reports the consumption of 400 grams of fruits and vegetables daily has a preventative effect against a host of chronic diseases (38). Pantry participants had access to a fresh fruits and vegetables market twice a week in the surrounding geographical area for our study. This fresh market pantry is not the norm. This could explain why some participants with greater access to fresh produce may have perceived their health more positively. Future research is needed to determine the relationship between health perception and diet quality.

Limitations

This study is limited by its use of convenience sampling, which may have caused our sample to be non-representative of the true pantry population. Thus, it is possible our study sample is not fully generalizable. Survey results were collected in the pantry

in semi-private areas. There is no guarantee all interviews with participants were private, and thus, data could have been affected by social response bias. The presence of reporting bias is also plausible due to participants' need to self-report much of the information obtained. Memory, knowledge of the intended assessment, and honesty are all possible influences on self-reported data.

Significance of fruits/vegetables/legumes consumption should be interpreted carefully given they were combined in the analysis. Not accounted for in the measurement of dairy consumption was the differentiation between fat contents (skim, 1%, 2%, whole). A useful measurement that could have helped interpret results, but was not assessed during the study, was health literacy. Due to the varying levels of health literacy within this population, survey questions may have been misinterpreted.

Future Implications

These findings indicate food pantry clients at this location are grossly underdiagnosed and remain untreated for chronic health conditions. This study is one of few among the literature to use health perception to estimate chronic health conditions and food security status. As our investigation shows, it is the only study to examine dietary intake against health perception. Future research is needed to determine the role that health literacy has on self-reported health status and chronic disease awareness. Future studies on dietary intake of an at-risk population should assess health perception to acquire more understanding of the role it plays in diet quality.

References

1. Coleman-Jensen A, Gregory C, Singh A, Carlson S. *Household Food Security in the United States in 2014*. U.S. Department of Agriculture; 2015. Available at: http://www.ers.usda.gov/media/1896841/err194.pdf [Accessed April 20, 2015].
2. Map the Meal Gap. *Feeding America*. http://map.feedingamerica.org/. [Accessed April 21, 2015].
3. Ohio Association of Foodbanks *Hunger in Ohio 2014: Executive Summary*. 2014. http://ohiofoodbanks.org/docs/publications/hunger_in_OH_2014_summary.pdf [Accessed April 20, 2015].
4. Franklin County Community Health Needs Assessment Steering Committee. Franklin County HealthMap 2013: navigating our way to a healthier community together. Columbus (OH): Central Ohio Hospital Council; 2013. Available at: http://medicalcenter.osu.edu/aboutus/community_commitment/Documents/FranklinCountyHealthMap2013.pdf. [Accessed April 26, 2015.]
5. Wilson, I. B., & Cleary, P. D. (January 04, 1995). Linking clinical variables with health-related quality of life. *Jama: Journal of the American Medical Association, 273,* 1.)
6. Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta (GA): US Department of Health and Human Services; 2010. Available at: http://www.cdc.gov/brfss/annual_data/annual_2010.htm.
7. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System (BRFSS) survey questionnaire. Atlanta (GA): US Department of Health and Human Services; 2012. Available at: http://www.cdc.gov/brfss/questionnaires.htm.
8. Kushel MB, Gupta R, Gee L, Haas JS. Housing Instability and Food Insecurity as Barriers to Health Care Among Low-Income Americans. *Journal of General Internal Medicine*. 2006;21(1):71-77. doi:10.1111/j.1525-1497.2005.00278.x. [Accessed April 21, 2015].
9. Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1995. [Accessed April 20, 2015].
10. Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2013. [Accessed April 20, 2015].
11. Pheley AM, Holben DH, Graham AS, Simpson C. Food Security and Perceptions of Health Status: A Preliminary Study in Rural Appalachia. *The Journal of Rural Health*. 2002;18(3):447-453. doi:10.1111/j.1748-0361.2002.tb00909.x. [Accessed April 20, 2015].

12. Browning CR, Cagney KA. Moving beyond Poverty: Neighborhood Structure, Social Processes, and Health. *Journal of Health and Social Behavior*. 2003;44(4):552-571. doi:10.2307/1519799. [Accessed April 20, 2015].
13. O'Connell KE, LD DHHPR, PhD JPH. Use of Food Pantries is Associated with Household Food Insecurity in Ohio. *Journal of Hunger & Environmental Nutrition*. 2008;2(2-3):93-109. doi:10.1080/19320240801891503. [Accessed April 20, 2015].
14. Seligman HK, Laraia BA, Kushel MB. Food Insecurity Is Associated with Chronic Disease among Low-Income NHANES Participants. *J Nutr*. 2010;140(2):304-310. doi:10.3945/jn.109.112573. [Accessed April 20, 2015].
15. Vozoris NT, Tarasuk VS. Household Food Insufficiency Is Associated with Poorer Health. *J Nutr*. 2003;133(1):120-126. [Accessed April 20, 2015].
16. Dibsdall LA, Lambert N, Bobbin RF, Frewer LJ. Low-income consumers' attitudes and behaviour towards access, availability and motivation to eat fruit and vegetables. *Public Health Nutr*. 2003;6(2):159-168. doi:10.1079/PHN2002412. [Accessed April 20, 2015].
17. Guenther PM, Casavale KO, Reedy J, et al. Update of the Healthy Eating Index: HEI-2010. *J Acad Nutr Diet*. 2013;113(4):569-580. doi:10.1016/j.jand.2012.12.016. [Accessed April 21, 2015].
18. Duffy P, Zizza C, Jacoby J, Tayie FA. Diet Quality is Low among Female Food Pantry Clients in Eastern Alabama. *Journal of Nutrition Education and Behavior*. 2009;41(6):414-419. doi:10.1016/j.jneb.2008.09.002. [Accessed April 20, 2015].
19. Robaina KA, Martin KS. Food Insecurity, Poor Diet Quality, and Obesity among Food Pantry Participants in Hartford, CT. *Journal of Nutrition Education and Behavior*. 2013;45(2):159-164. doi:10.1016/j.jneb.2012.07.001. [Accessed April 20, 2015].
20. Akobundu UO, Cohen NL, Laus MJ, Schulte MJ, Soussloff MN. Vitamins A and C, calcium, fruit, and dairy products are limited in food pantries. *Journal of the American Dietetic Association*. 2004;104(5):811-813. doi:10.1016/j.jada.2004.03.009. [Accessed April 20, 2015].
21. Starkey LJ. An evaluation of emergency food bags. *Journal of the Canadian Dietetic Association (Canada)*. 1994. http://agris.fao.org/agris-search/search.do?recordID=CA9502853. [Accessed April 20, 2015].
22. Derrickson JP, Jarosz L, Widodo MME. Providers of food to homeless and hungry people need more dairy, fruit, vegetable, and lean-meat items. *Journal of the American Dietetic Association*. 1994;94(4):445+. [Accessed April 20, 2015].
23. Glanz K, Rimer BK. 1995. Theory at a Glance: A Guide to Health Promotion Practice. Bethesda MD: National Cancer Institute. 2nd edition 2005. NIH Publ. 05-3896. [Accessed April 20, 2015].
24. Stuff JE, Casey PH, Szeto KL, et al. Household Food Insecurity Is Associated with Adult Health Status. *J Nutr*. 2004;134(9):2330-2335. [Accessed April 20, 2015].
25. Economic Research Service. US household food security survey module: six item short form. Washington (DC): US Department of Agriculture; 2012.

http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools.aspx#adult [Accessed April 20, 2015].
26. National Health and Nutrition Examination Survey. NHANES 2009 - 2010: Dietary Screener Questionnaire. Atlanta, GA: Center for Disease Control and Prevention; 2012 http://wwwn.cdc.gov/nchs/nhanes/2009-2010/DTQ_F.htm. [Accessed April 20, 2015].
27. American Heart Association. Understanding Blood Pressure Readings. 2014. http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/AboutHighBloodPressure/Understanding-Blood-Pressure-Readings_UCM_301764_Article.jsp [Accessed May 4, 2015].
28. Amercian Heart Association. Diagnosing Diabetes and Learning About Prediabetes. 2014. http://www.diabetes.org/diabetes-basics/diagnosis/[Accessed May 4, 2015].
29. National Heart, Lung, and Blood Institute. Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks. 2013. Available at: http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/bmi_dis.htm [Accessed May 4, 2015].
30. Kaplan, G. A., Goldberg, D. E., Everson, S. A., Cohen, R. D., Salonen, R., Tuomilehto, J., & Salonen, J. (January 01, 1996). Perceived health status and morbidity and mortality: evidence from the Kuopio ischaemic heart disease risk factor study. *International Journal of Epidemiology, 25,* 2, 259-65. [Accessed by April 10, 2016].
31. U.S. Department of Health and Human Services. “Health Literacy Basics” http://health.gov/communication/literacy/quickguide/ [Accessed by April 10, 2016].
32. Williams MV, Baker DW, Parker RM, Nurss JR. 1998. Relationship of functional health literacy to patients' knowledge of their chronic disease. A study of patients with hypertension and diabetes. *Archives of Internal Medicine.* 158(2): 166-172. [Accessed by April 10, 2016]
33. Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., Cushman, M., de, F. S., ... American Heart Association Statistics Committee and Stroke Statistics Subcommittee. (January 01, 2015). Heart disease and stroke statistics--2015 update: a report from the American Heart Association. *Circulation, 131,* 4, 29-322. [Accessed by April 10, 2016].
34. Poston, Bob. "Maslow’s hierarchy of needs." *surgical technologist* (2009): 348. http://www.ast.org/pdf/308.pdf [Accessed April 11, 2016]
35. D. Martin and K. Joomis. Building Teachers: A Constructivist Approach to Introducing Education, (Belmont, CA: Wadsworth, 2007), pp. 72–75. http://www.cengage.com/resource_uploads/downloads/0495570540_162121.pdf [Accessed April 11, 2016]
36. Fulgoni, V. ., Nicholls, J., Reed, A., Buckley, R., Kafer, K., Huth, P., DiRienzo, D., ... Miller, G. D. (January 01, 2007). Dairy consumption and related nutrient intake in African-American adults and children in the United States: continuing survey of

food intakes by individuals 1994-1996, 1998, and the National Health And Nutrition Examination Survey 1999-2000. *Journal of the American Dietetic Association, 107,* 2, 256-64.

37. Reusser ME, DiRienzo DB, Miller GD, McCarron DA. Adequate nutrient intake can reduce cardiovascular disease risk in African Americans. *Journal of the National Medical Association*. 2003;95(3):188-195.
38. Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases (2002 : Geneva, Switzerland). Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert Consultation. http://apps.who.int/iris/bitstream/10665/42665/1/WHO_TRS_916.pdf?ua=1 [Accessed by April 10, 2016]

Appendix A

U.S. Household Food Security Survey Module: Six-Item Short Form
Economic Research Service, USDA
September 2012

Revision Notes: The food security questions in the 6-item module are essentially unchanged from those in the original module first implemented in 1995 and described previously in this document.

September 2012:

- Added coding specification for "How many days" for 30-day version of AD1a.

July 2008:

- Wording of resource constraint in AD2 was corrected to, "…because there wasn't enough money for food" to be consistent with the intention of the September 2006 revision.

January 2008:

- Corrected user notes for coding AD1a.

September 2006:

- Minor changes were introduced to standardize wording of the resource constraint in most questions to read, "…because there wasn't enough money for food."
- Question numbers were changed to be consistent with those in the revised Household Food Security Survey Module.
- User notes following the questionnaire were revised to be consistent with current practice and with new labels for ranges of food security and food insecurity introduced by USDA in 2006.

Overview: The six-item short form of the survey module and the associated Six-Item Food Security Scale were developed by researchers at the National Center for Health Statistics.

Background: The six-item short form of the survey module and the associated Six-Item Food Security Scale were developed by researchers at the National Center for Health Statistics in collaboration with Abt Associates Inc. and documented in "The effectiveness of a short form of the household food security scale," by S.J. Blumberg, K. Bialostosky, W.L. Hamilton, and R.R. Briefel (published by the *American Journal of Public Health*, vol. 89, pp. 1231-34, 1999). ERS conducted additional assessment of classification sensitivity, specificity, and bias relative to the 18-item scale.
If respondent burden permits, use of the 18-item U.S. Household Food Security Survey Module or the 10-item U.S. Adult Food Security Survey Module is recommended. However, in surveys that cannot implement one of those measures, the six-item module may provide an acceptable substitute. It has been shown to identify food-insecure households and households with very low food security with reasonably high specificity and sensitivity and minimal bias compared with the 18-item measure. It does not, however, directly ask about children's food security, and does not measure the most severe range of adult food insecurity, in which children's food intake is likely to be reduced.

[Begin Six-Item Food Security Module]

Transition into Module :
These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

NOTE: If the placement of these items in the survey makes the transition/introductory sentence unnecessary, add the word "Now" to the beginning of question HH3: "Now I'm going to read you...."

FILL INSTRUCTIONS: Select the appropriate fill from parenthetical choices depending on the number of persons and number of adults in the household.

HH3. I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last (name of current month).

The first statement is, "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

HH4. "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

AD1. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

[ ] Yes
[ ] No (Skip AD1a)
[ ] DK (Skip AD1a)

AD1a. [IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK

AD2. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

[ ] Yes
[ ] No
[ ] DK

AD3. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

[ ] Yes
[ ] No
[ ] DK

[End of Six-Item Food Security Module]
User Notes

(1) Coding Responses and Assessing Households' Food Security Status:

Responses of "often" or "sometimes" on questions HH3 and HH4, and "yes" on AD1, AD2, and AD3 are coded as affirmative (yes). Responses of "almost every month" and "some months but not every month" on AD1a are coded as affirmative (yes). The sum of affirmative responses to the six questions in the module is the household's raw score on the scale.

Food security status is assigned as follows:

- Raw score 0-1—High or marginal food security (raw score 1 may be considered marginal food security, but a large proportion of households that would be measured as having marginal food security using the household or adult scale will have raw score zero on the six-item scale)
- Raw score 2-4—Low food security
- Raw score 5-6—Very low food security

For some reporting purposes, the food security status of households with raw score 0-1 is described as food secure and the two categories "low food security" and "very low food security" in combination are referred to as food insecure.

For statistical procedures that require an interval-level measure, the following scale scores, based on the Rasch measurement model may be used:

Number of affirmatives	Scale score
0	NA
1	2.86
2	4.19
3	5.27
4	6.30
5	7.54
6 (evaluated at 5.5)	8.48

However, no interval-level score is defined for households that affirm no items. (They are food secure, but the extent to which their food security differs from households that affirm one item is not known.)

(2) Response Options: For interviewer-administered surveys, DK ("don't know") and "Refused" are blind responses—that is, they are not presented as response options but marked if volunteered. For self-administered surveys, "don't know" is presented as a response option.

(3) Screening: If it is important to minimize respondent burden, respondents may be screened after question AD1. Households that have responded "never" to HH3 and HH4 and "no" to AD1 may skip over the remaining questions and be assigned raw score zero. In pilot surveys intended to validate the module in a new cultural, linguistic, or survey context, however, screening should be avoided if possible and all questions should be administered to all respondents.

(4) 30-Day Reference Period: The questionnaire items may be modified to a 30-day reference period by changing the "last 12-month" references to "last 30 days." In this case, item AD1a must be changed to read as follows:

AD1a. [IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?

_____ days

[ ] DK

Responses of 3 days or more are coded as "affirmative" responses.

(5) Self Administration: The six-item module has been used successfully in mail-out, take-home, and on-site self-administered surveys. For self-administration, question AD1a may be presented in one of two ways:

- Indent AD1a below AD1 and direct the respondent to AD1a with an arrow from the "Yes" response box of AD1. In a parenthetical following the "No" response box of AD1, instruct the respondent to skip question AD1 and go to question AD2.
- Present the following response options to question AD1 and omit question AD1a:
    - Yes, almost every month
    - Yes, some months but not every month
    - Yes, only 1 or 2 months
    - No

  In this case, either of the first two responses is scored as two affirmative responses, while "Yes, only 1 or 2 months" is scored as a single affirmative response.

The two approaches have been found to yield nearly equal results. The latter may be preferred because it usually reduces the proportion of respondents with missing information on how often this behavior occur

Appendix B: Personal Health Assessment

1.1 What is your age?

_ _ Years
0 7 Don't know / Not sure
0 9 Prefer not to answer

1.2 What is your gender?

1 Male
2 Female
7 Don't know / Not sure
9 Prefer not to answer

1.3 Do you consider yourself to be Hispanic, Latino, or of Spanish origin?

1 Yes
2 No
7 Don't know/ Not sure
9 Prefer not to answer

What race or races do you consider yourself to be?

Please select one or more:

1 American Indian or Alaskan Native
2 Asian
3 Black or African American
4 Native Hawaiian or Pacific Islander
5 White
6 Other
7 Don't know/ Not sure
9 Prefer not to answer

1.4 Are you…?

1 Married
2 Divorced
3 Widowed
4 Separated
5 Never married
6 A member of an unmarried couple
9 Prefer not to answer

1.5 What is the highest grade or year of school you completed?

1 Never attended school or only attended kindergarten
2 Grades 1 through 8 (Elementary)
3 Grades 9 through 11 (Some high school)
4 Grade 12 or GED (High school graduate)

5 College 1 year to 3 years (Some college or technical school)
6 College 4 years or more (College graduate)
9 Prefer not to answer

1.6 Are you currently…?

1 Employed for wages
2 Self-employed
3 Out of work for 1 year or more
4 Out of work for less than 1 year
5 A Homemaker
6 A Student
7 Retired
8 Unable to work

1.6.1 If unable to work, why?

1 Chronic disease or other illness
2 Physical disability
3 Mental illness
4 Caring for a sick or disabled family member
5 Other
9 Prefer not to answer

1.7 Is your annual household income from all sources:

0 1 <$10,000
0 2 $10,000-$25,000
0 3 $25,000-$49,999
0 4 $50,000-$75,000
0 5 > $75,000
7 7 Don't know / Not sure
9 9 Prefer not to answer

1.8 What is the ZIP Code where you live?

_ _ _ _ _ ZIP Code
7 7 7 7 7 Don't know / Not sure
9 9 9 9 9 Prefer not to answer

1.9 Do you own or rent your home?

1 Own
2 Rent
3 Other arrangement
7 Don't know / Not sure
9 Prefer not to answer

2.1 Do you have a cell phone for personal use? Please include cell phones used for both business and personal use.

1 Yes
2 No
7 Don't know / Not sure
9 Prefer not to answer

2.1.1 Do you have a smart phone?

1 Yes
2 No
7 Don't know / Not sure
9 Prefer not to answer

2.1.2 Do you use text messaging?

1 Yes
2 No
7 Don't know / Not sure
9 Prefer not to answer

2.2 Have you used the Internet in the past 30 days?

1 Yes
2 No
7 Don't know/Not sure
9 Prefer not to answer

3.1 Do you have any kind of health care coverage, including health insurance, prepaid plans (such as HMOs, government plans such as Medicare, or Indian Health Service)?

1 Yes
2 No
7 Don't know / Not sure
9 Prefer not to answer

3.2 Are you CURRENTLY covered by any of the following types of health insurance or health coverage plans? (Select ALL that apply)

1 Your employer
2 Someone else's employer
3 A plan that you or someone else buys on your own
4 Medicaid or Medical Assistance [or substitute state program name]
5 The military, CHAMPUS, or the VA [or CHAMP-VA]
6 The Indian Health Service [or the Alaska Native Health Service]
7 Other
88 None
77 Don't know/Not sure

99 Prefer not to answer

3.3 In the PAST 12 MONTHS was there any time when you did NOT have ANY health insurance or coverage?

1 Yes
2 No
7 Don't know/Not sure
9 Prefer not to answer

3.3.1 If "Yes", ask: For how many months of the past 12 months did you have no health insurance at all?

_ _ Number of Months

4.1 Do you have one person you think of as your personal doctor or health care provider?

1 Yes, only one
2 More than one
3 No
7 Don't know / Not sure
9 Prefer not to answer

4.1.1 If "Yes," Who do you think of as your personal doctor or health care provider (check all that apply)?

1 Family physician
2 Nurse practitioner
3 Physician's assistant
4 Other

4.2 Where do you go for medical care?

1 Primary care or family physician
2 Urgent care
3 Emergency room
4 Free clinic
5 Does not seek treatment
6 Other

5.1 Would you say that in general your health is:

1 Excellent
2 Very good
3 Good
4 Fair
5 Poor
7 Don't know / Not sure
9 Prefer not to answer

5.6 In the last month, have you experienced difficulty with any of the following (check all that apply)?

1 ☐ Appearance
2 ☐ Bathing/dressing
3 ☐ Hair Loss
4 ☐ Breathing
5 ☐ Changes in urination
6 ☐ Constipation
7 ☐ Diarrhea
8 ☐ Eating
9 ☐ Fatigue
10 ☐ Feeling swollen
11 ☐ Fevers
12 ☐ Getting around
13 ☐ Indigestion
14 ☐ Memory/concentration
15 ☐ Mouth sores
16 ☐ Nausea
17 ☐ Nose dry/congested
18 ☐ Pain
19 ☐ Fertility or sexual side effects
20 ☐ Skin problems (dry/itchy)
21 ☐ Sleep
22 ☐ Tingling hands/feet
23 ☐ Other ☐

7.1 Have you been diagnosed with any diseases or conditions (like cancer, diabetes or hypertension)?

1 Yes
2 No
7 Don't know / Not sure
9 Prefer not to answer

7.1.1 If "Yes", what diseases or medical conditions have you been diagnosed with (check all that apply)?

1 Diabetes (Type 2)
2 Hypertension
3 Obesity
4 Cancer
If so, type:
5 Respiratory Disease
If so, type:
6 Other (list all) ☐

7 Don’t know / Not sure
9 Prefer not to answer

7.2 How confident are you in your overall ability to achieve/maintain a healthy body weight? Would you say you are:

1 Not confident at all
2 Somewhat confident
3 Confident
4 Very confident
5 I prefer not to answer

7.3 How confident are you in your overall ability to engage in physical activity on a regular basis (10,000 steps per day or 150 minutes/week)? Would you say you are:

1 Not confident at all
2 Somewhat confident
3 Confident
4 Very confident
5 I prefer not to answer

7.4 How confident are you in your overall ability to eat a predominately plant based diet? Would you say you are:

1 Not confident at all
2 Somewhat confident
3 Confident
4 Very confident
5 I prefer not to answer

7.5 How confident are you in your overall ability to make decisions about medical screenings, treatments, and/or disease management? Would you say you are:

1 Not confident at all
2 Somewhat confident
3 Confident
4 Very confident
5 I prefer not to answer

7.6 How confident are you in your overall ability to change your current behaviors or activities or attitudes to improve your overall health? Would you say you are:

1 Not confident at all
2 Somewhat confident
3 Confident
4 Very confident
5 I prefer not to answer

Appendix C: NHANES DSQ

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
1	DSQ_xx1	Num	3	How old are you (in years)? 01-99 = Age
2	DSQ_xx2	Char	6	Are you male or female? A = Male B = Female
3	DSQ_010	Char	27	During the past month, how often did you eat **hot or cold cereals**? *Mark one* A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
4	DSQ_020	Char	80	During the past month, what kind of cereal did you usually eat? *Print cereal.* See Appendix A, List of Cereals
5	DSQ_xx3	Char	80	If there was another kind of cereal that you usually ate during the past month, what kind was it? *Print cereal, if none leave blank* See Appendix A, List of Cereals

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
6	DSQ_030	Char	33	During the past month, how often did you have any **milk** (either to drink or on cereal)? Include regular milks, chocolate or other flavored milks, lactose-free milk, buttermilk. Please do **not** include soy milk or small amounts of milk in coffee or tea. *Mark one* A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2-3 times per day J = 4-5 times per day K = 6 or more times per day
7	DSQ_xx4	Char	18	During the past month, what kind of milk did you usually drink? *Mark one* A = Whole or regular milk B = 2% fat or reduced-fat milk C = 1%, ½%, or low-fat milk D = Fat-free, skim or nonfat milk E = Soy milk F = Other kind of milk
7	DSQ_xx4os	Char	30	During the past month, what kind of milk did you usually drink? Other Specify See Appendix B, List of Milks

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
8	DSQ_040	Char	33	During the past month, how often did you drink **regular soda or pop** that contains sugar? Do **not** include diet soda. *Mark one* A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2-3 times per day J = 4-5 times per day K = 6 or more times per day
9	DSQ_050	Char	33	During the past month, how often did you drink **100% pure fruit juices** such as orange, mango, apple, grape and pineapple juices? Do **not** include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. *Mark one* A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2-3 times per day J = 4-5 times per day K = 6 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
10	DSQ_060	Char	33	During the past month, how often did you drink coffee or tea that had **sugar** or **honey** added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do **not** include artificially sweetened coffee or diet tea. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2-3 times per day J = 4-5 times per day K = 6 or more times per day
11	DSQ_070	Char	33	During the past month, how often did you drink **sweetened** fruit drinks, sports or energy drinks, such as Kool-Aid, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull or Vitamin Water? Include fruit juices you made at home and added sugar to. Do **not** include diet drinks or artificially sweetened drinks. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2-3 times per day J = 4-5 times per day K = 6 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
12	DSQ_080	Char	27	During the past month, how often did you eat **fruit**? Include fresh, frozen or canned fruit. Do **not** include juices. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
13	DSQ_090	Char	27	During the past month, how often did you eat a green leafy or lettuce **salad**, with or without other vegetables? A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
14	DSQ_100	Char	27	During the past month, how often did you eat any kind of **fried potatoes**, including French fries, home fries, or hash brown potatoes? A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
15	DSQ_110	Char	27	During the past month, how often did you eat any **other kind of potatoes**, such as baked, boiled, mashed potatoes, sweet potatoes, or potato salad? A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
16	DSQ_120	Char	27	During the past month, how often did you eat refried beans, baked beans, beans in soup, pork and beans or any other type of cooked dried beans? Do **not** include green beans. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
17	DSQ_210	Char	27	During the past month, how often did you eat **brown rice** or other cooked whole grains, such as bulgur, cracked wheat, or millet? Do **not** include white rice. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
18	DSQ_130	Char	27	During the past month, not including what you just told me about (green salads, potatoes, cooked dried beans), how often did you eat **other vegetables**? A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
19	DSQ_150	Char	27	During the past month, how often did you have Mexican-type **salsa** made with tomato? A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
20	DSQ_140	Char	27	During the past month, how often did you eat **pizza**? Include frozen pizza, fast food pizza, and homemade pizza. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
21	DSQ_160	Char	27	During the past month, how often did you have **tomato sauces** such as with spagetti or noodles or mixed into foods such as lasagna? Do not include tomato sauce on pizza. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
22	DSQ_190	Char	27	During the past month, how often did you eat any kind of **cheese**? Include cheese as a snack, cheese on burgers, sandwiches, and cheese in foods such as lasagna, quesadillas, or casseroles. Do **not** include cheese on pizza. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
23	DSQ_170	Char	27	During the past month, how often did you eat **red meat**, such as beef, pork, ham, or sausage? Do **not** include chicken, turkey or seafood. Include red meat you had in sandwiches, lasagna, stew, and other mixtures. Red meats may also include veal, lamb, and any lunch meats made with these meats. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
24	DSQ_180	Char	27	During the past month, how often did you eat any **processed meat**, such as bacon, lunch meats, or hot dogs? Include processed meats you had in sandwiches, soups, pizza, casseroles, and other mixtures. Processed meats are those preserved by smoking, curing, or salting, or by the addition of preservatives. Examples are: ham, bacon, pastrami, salami, sausages, bratwursts, frankfurters, hot dogs, and spam. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
25	DSQ_200	Char	27	During the past month, how often did you eat **whole grain bread** including toast, rolls and in sandwiches? Whole grain breads include whole wheat, rye, oatmeal and pumpernickel. Do **not** include white bread. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
26	DSQ_220	Char	27	During the past month, how often did you eat **chocolate** or any other types of candy? Do **not** include sugar-free candy. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
27	DSQ_230	Char	27	During the past month, how often did you eat **doughnuts**, sweet rolls, Danish, muffins, pan dulce, or pop-tarts? Do **not** include sugar-free items. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
28	DSQ_240	Char	27	During the past month, how often did you eat **cookies, cake, pie or brownies**? Do **not** include sugar-free kinds. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
29	DSQ_250	Char	27	During the past month, how often did you eat **ice cream or other frozen desserts**? Do **not** include sugar-free kinds. A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day
30	DSQ_260	Char	27	During the past month, how often did you eat **popcorn**? A = Never B = 1 time last month C = 2-3 times last month D = 1 time per week E = 2 times per week F = 3-4 times per week G = 5-6 times per week H = 1 time per day I = 2 or more times per day

Quex No.	Variable Name	Attribute	Length	Variable Description and Codes
ID	UNIQUEID	Char	30	Participant ID on page 1
ID	UNIQUEID_2	Char	30	Participant ID on page 2
ID	UNIQUEID_3	Char	30	Participant ID on page 3
ID	UNIQUEID_4	Char	30	Participant ID on page 4
ID	UNIQUEID_5	Char	30	Participant ID on page 5

Appendix D

CVD & STROKE CARE CARD

Risk Factor/Assessment Result	Healthy or Minimal Risk Health and Wellness Education	Symptoms Present: Education & Refer	Disease or Condition Present Education & Referral	Hig
Blood Pressure	< 120/80	121-139/81-89	> 140/90 Repeat after 5 min rest	>18 Contact fa
Cholesterol	< 200	<200	200-239	>
Diabetes (Type 2)	No BG<200 A1c<6.5	Borderline BG>200 A1c<6.5	Yes BG>200 A1c>6.5	
Smoking	No	Yes (trying to quit)	Yes	
Atrial Fibrillation	Regular heartbeat	Unsure	Irregular heartbeat	
Weight	BMI <25 WC <40" Men / <35" Women	BMI 25-29 WC >40" Men / >35" Women	BMI >30	
Physical Activity	>150 min/wk moderate intensity OR >75 min /wk vigorous intensity	<150 min/wk moderate intensity OR <75 min/wk vigorous intensity	Sedentary	
Family history stroke	No	Unsure	Yes	
TOTALS OF ABOVE	6-8	4-6	Any/= 3	
Education Recommendations	General Health and Wellness Education	Condition-Specific Education	Condition Specific Education	CA
Referral Recommendations	None	Recommend physician follow up visit	Refer to physician for follow-up	CA